Fitness For Our Force

Strength Training

Lesson 5

Strength, Endurance & Weight Loss

This presentation is designed to provide information on strength and endurance increases in the major muscle group and how to effectively reach your weight loss goals.

Definitions:

- Muscular Strength

- Muscular Endurance

Major Muscle Groups:

- Deltoids
- Pectoralis Major
- Biceps
- Abdominals
- Quadriceps
- Trapezius
- Triceps
- Latissimus Dorsi
- Hamstrings

- Describe and demonstrate Exercises Designed to Increase Strength and Endurance for Each A major Muscle Group

Strengthening the Deltoids

- shoulder press on a machine:
- What the shoulder press does:

Strengthening the Pectoral Muscles

- Bench Press
- What the bench press does:

Strengthening the Biceps

- arm curls
- What arm curls do:

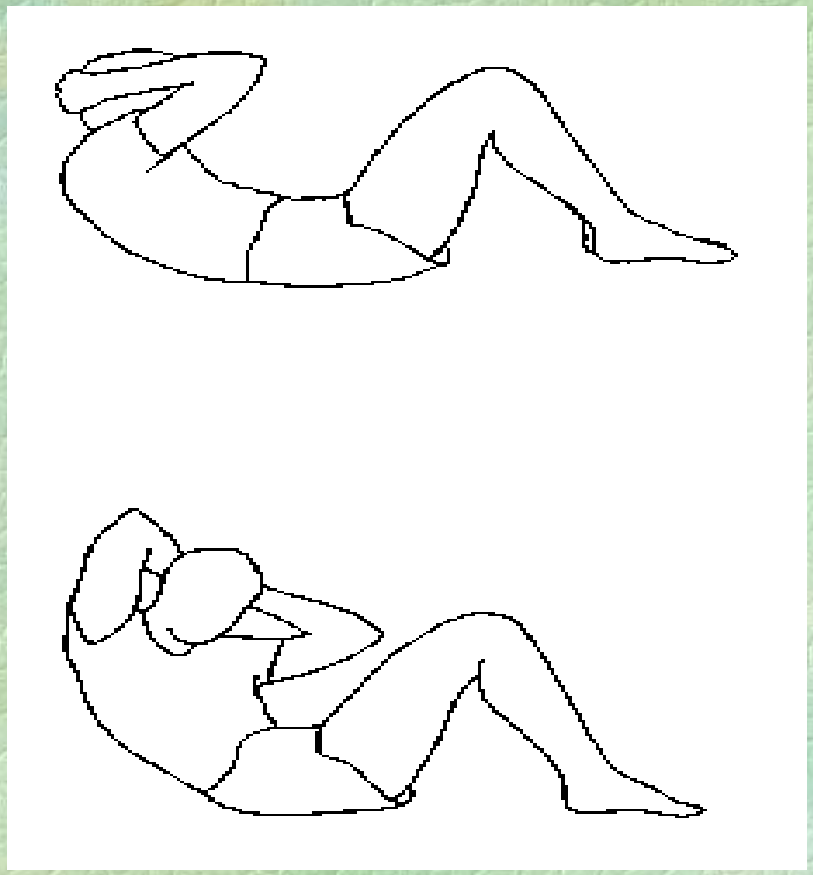
Strengthening the Abdominals

- Curl-Ups

- **Starting Position:** Lie on your back with your hips and knees comfortably bent and your an-knees folded across your chest (easier) or clasped behind your head (more difficult).
  - **Beginner action:** Tuck chin towards chest and slowly bring your shoulders halfway off the floor towards your knees. Slowly lower yourself down to the starting position.
  - **Advanced action:** As you come up, rotate your elbow to the opposite knee. Alternate right and left sides.

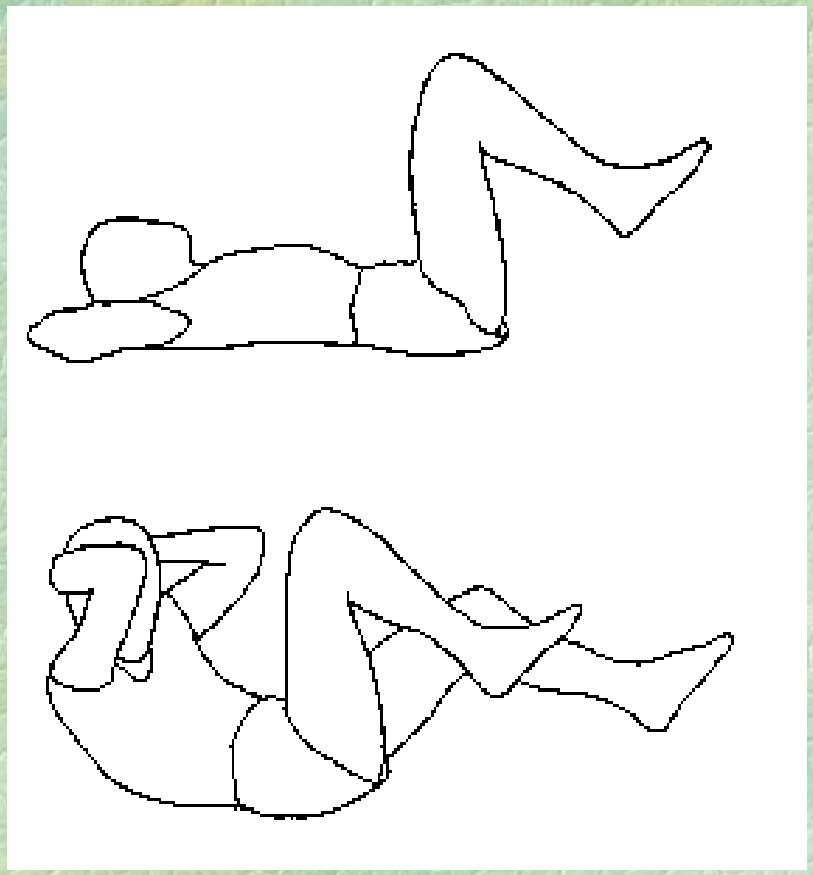
Demonstration

- Demonstration of the beginner and advanced sit up technique.



Spiders

- **Starting position:** Lie on your back and clasp your hands behind your head. Bend both knees and raise them towards your chest.
  Action: Raise your neck and shoulders off the floor. Simultaneously move your right elbow and left knee towards each other while keeping your head, shoulders, and legs off the floor. Repeat with your left elbow and right knee. Never allow shoulders or legs to rest on the floor.



Strengthening the Quadriceps

- leg extension on a machine
- What leg extensions do:

Strengthening the Trapezius

- Shoulder Shrugs
- Done with free weights held in each hand
- Stand in an erect position with hands at your side
- Shrugs with the shoulders bringing them up towards you ears
- Repeat this slowly

Strengthening the Triceps

- tricep push down
- What tricep push downs will do:

Strengthening the Latissimus Dorisi

- Lat Pull
- What lat pulls do:

Strengthening the Hamstrings

- Leg Curls on a machine
- What leg curls do:

Strength and Power - Muscular Development

- The Most Important Factors in Increasing Muscle Size and Strength Are Adequate Energy Intake (Carbohydrates) and Strength Training.
- Mega-Dose of Supplements (Including Protein) Do Not Compensate for a Lack of Training or Talent nor Do They Give an Individual or Athlete ‘an Edge’.

Benefits of Strength Training

- Strength
- Neural
- Affect on Body Composition
  - Affect on Bmr
- Bone
- Glucose-Insulin Dynamics
- Psychological

Detriments of Strength Training

- Injury
- Delayed Onset Muscle Soreness (DOMS)

Principles of a Strength Training Program

Apply use of basic principles involving:

- Overload
- Progression
- Specificity
- Variation
- Individual
- Moderation
- *Reversibility*

Important Terms

- Intensity - Amount of Weight/Rep (**Load**)
  - Most Critical!
  - Use % Rm
- Volume - Total Weight Lifted in a Session
  - (Sets X Reps X Load)
  - Body Builder Should Increase Volume With Reps
  - Strength Athlete Should Increase Volume With Sets
- Frequency - Sessions in Given Time
  - Days/Week Dependent on Training Level
    - Hypert/End- More Freq, Low Resist, High Volume
    - Str/Pwr-Less Freq, High Resist, Low Volume

Estimating One-Repetition Maximum

% of 1RM:	100.0	96.5	91.0	88.5	86.0	83.5	81.0	78.5	76.0	73.5
Repetitions:	1	2	3	4	5	6	7	8	9	10
Weight lifted (lb):	135.0	126.2	122.9	119.5	116.1	112.7	109.4	106.0	102.6	99.2
140.0	130.9	127.4	123.9	120.4	116.9	113.4	109.9	106.4	102.9	
145.0	135.6	132.0	128.3	124.7	121.1	117.5	113.8	110.2	106.6	
150.0	140.3	136.5	132.8	129.0	125.3	121.5	117.8	114.0	110.3	
155.0	144.9	141.1	137.2	133.3	129.4	125.6	121.7	117.8	113.9	

Ref: NCSA Essentials of Strength Training and Conditioning. Table 26

Where to Start?

- Repetition Maximum (Rm)
  - Start With 10 Rm
  - Achieve in < 5 Trials
- Retest ~2 Weeks 10 Rm
- Retest ~6 Weeks 1-5 Rm

Getting Into It…

- Initially Train Alternate Days (Recovery)
- 12-15 Reps (60-80% of Rm)
- 2-3 Sets
- 1-2 Min Rest Between Sets
- Consider Machines
- Anti Inflammatory

How Long Before You’Re Like Arnold?

- Individual Response (Genetics)
- Initial Level Important
- Amount of Change Related to Effectiveness of Program

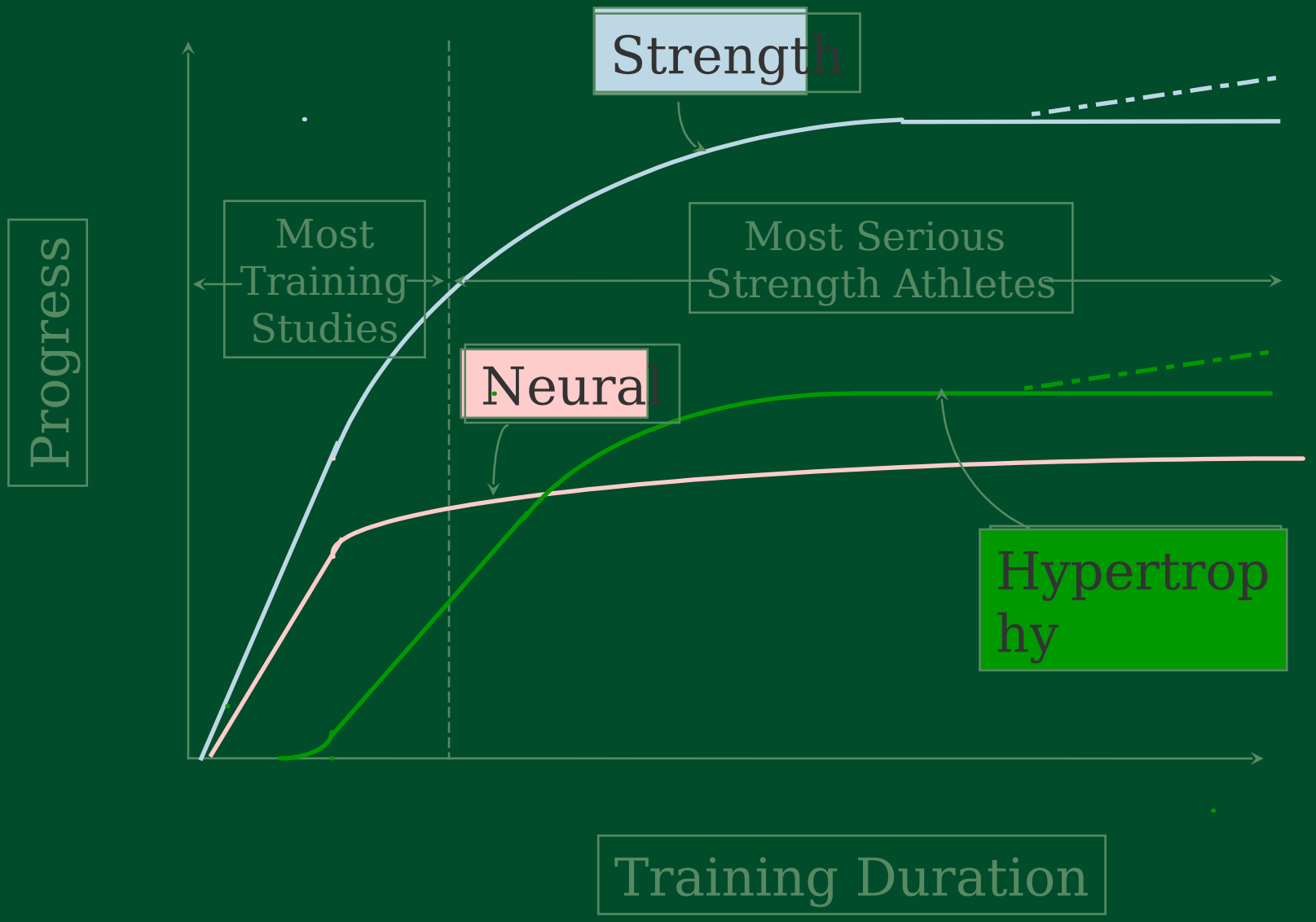
You Don’t Grow in the Weight the Room - You Grow the Other 22-23 Hours of the Day!

PHYSIOLOGICAL ADAPTATIONS THAT OCCUR IN RESPONSE TO RESISTANCE TRAINING

SYSTEM/_ VARIABLE RESPONSE	
Muscle Fibers	
Number	Equivocal
Size	Increase
Type	Unknown
Capillary Density	
In Body Builders	No change
In Power Lifters	Decrease
Mitochondrial	
Volume	Decrease
Density	Decrease

SYSTEM/_ VARIABLE RESPONSE	
VO_2max	
Circuit Resistance Trng	Increase
Heavy Resistance Trng	No Change
Connective Tissue	
Ligament Strength	Increase
Tendon Strength	Increase
Bone	
Mineral Content	Increase
Cross-Sectional Area	No Change

Modified from Fleck & Kramer, 1988



Adapted from Sale, D.G., 1988

Time Course

- Increased Strength *Prior* to Hypertrophy Due to Neural Enhancement
  - Recruitment
  - Cns Activation
  - Synchronization
  - Decreased Inhibition
- ~4 Wks Until Hypertrophy
  - Csa Increases, Especially Type Ii Fibers

Getting Serious…

- Strength Program Is Designed for the Individual and the Particular Sport

- Train the Energy System - Phosphocreatine
  - Can Deplete in ~15 Sec
  - Replete in ~3 Min

Percent Intensity, Repetition, Perceived Intensity And Training Effects

Absolute Intensity	Maximum Repetitions	Perceived Intensity	Training Effects
>100%	Negatives, partial range of movement	Super Max	Super Strength ROM limits Sticking points Neuro adaptations
100%	1	Super Heavy	Maximum Strength
95%	2		Minimal hypertrophy
92.5%	3		Tendon strength
90%	4		Neuron adaptations
87.5%	5	Heavy	Strength
85%	6		Moderate hypertrophy
82.5%	7		Strength development
80%	8		Neuro Adaptations
77.5%	9	Moderate	Strength / Power
75%	10		Maximal hypertrophy
72.5%	11-12		Strength endurance
70%	13-15		Muscular conditioning
67.5%		Light	Speed Strength
65%			Neuron adaptations
62.5%			Joint stability
60%			Endurance

Adapted from *JSTR*, 1994

Hypertrophy Vs. Strength/Power

- Hypertrophy:
  - Higher Volume
  - Short Rest (30-60 Sec)

- Strength:
  - Less Volume
  - Longer Rest (2-5 Min)

Weights and Reps

- 20+ Reps - Endurance, No Strength
  - Low Intensity - <70% 1Rm
- 6-12 Reps - Mod Str, Power, End, ***Hypertrophy***
  - Mod Intensity - 70-90% 1Rm
- <6 Reps - Strength and Power
  - High Intensity - >90% 1Rm

Periodization

- Gradual Cycling of
  - Intensity,
  - Volume,
  - Frequency, and
  - Specificity
- Training Shifts From *Non* Sport Specific, High Volume and Low Intensity to Sport Specific Low Volume, High Intensity

The Plan

- Macrocycle - Months to Years
- Mesocycle -
  - Preparatory (General Conditioning)
  - Transitional (Strength)
  - Competitive (Power)
  - Transitional (Active Rest)
- Microcycle
  - Weekly

Meso/Microcycles for Strength and Power

Week	Reps	Sets	Load(%Rm)	Rest
1-3	8-10	2-3	50-70	1-2
4-5	6	3-4	70-85	2-4
6-7	1-4	3-5	85-100	2-4

Adapted from Kraemer, 199

Example of a 4-Week Mesocycle During the Competitive Period

Week 1

1 Set* of 10 Repetitions at 75% of 1Rm

Week 2

1 Set* of 5 Repetitions at 85% of 1Rm

Week 3

1 Set* of 3 Repetitions at 92.5% Of 1Rm

Week 4

1 Set* of 1 Repetition at 102% to 105% of 1Rm

* Does Not Inclued Warm-up Sets

Periodization

Season **Period/Phase** **Training Schedule**

Preparatory: High Volume and Low Intensity

-Hypertrophy/ *Resistance Training:* High Volume, Low Intensity

Endurance *Metabolic Training:* Aerobic

***Technique:* High Volume, Low Intensity**

-Strength *Resistance:* Moderate Volume, Low Intensity, Specific

***Metabolic:* Interval Training**

***Speed:* Moderate Volume and Intensity**

-Power *Resistance:* Low Volume, High Intensity, Specific

***Metabolic:* Short intervals of Max to Near-max intensity**

***Speed:* High Intensity, Low Volume**

Transition All training of Low Volume and Low Intensity

Competition All training Low Volume and High Intensity

Maintenance

- 1D/Wk Has Been Shown to Maintain
- 2D/Wk More Realistic
- 2-3 Sets
- 6-12 Reps
- Whole Body Exercises

Detraining

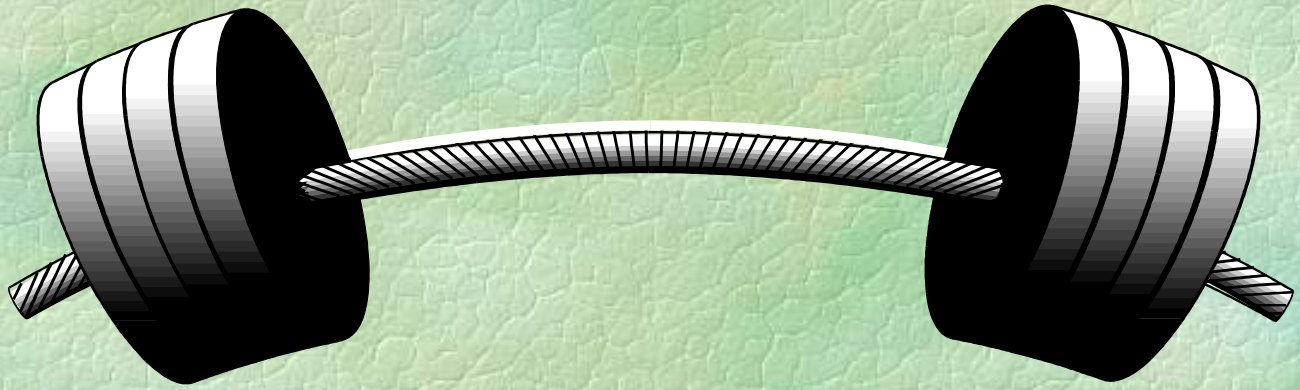
- 4 Weeks Detraining Results in Minimal Atrophy and Strength Loss
- After a Month, Decrease in Strength Faster Than Decrease in Size (Neural).
- Takes Longer for Females to Increase Muscle Mass, and They Detrain Faster.

Overtraining

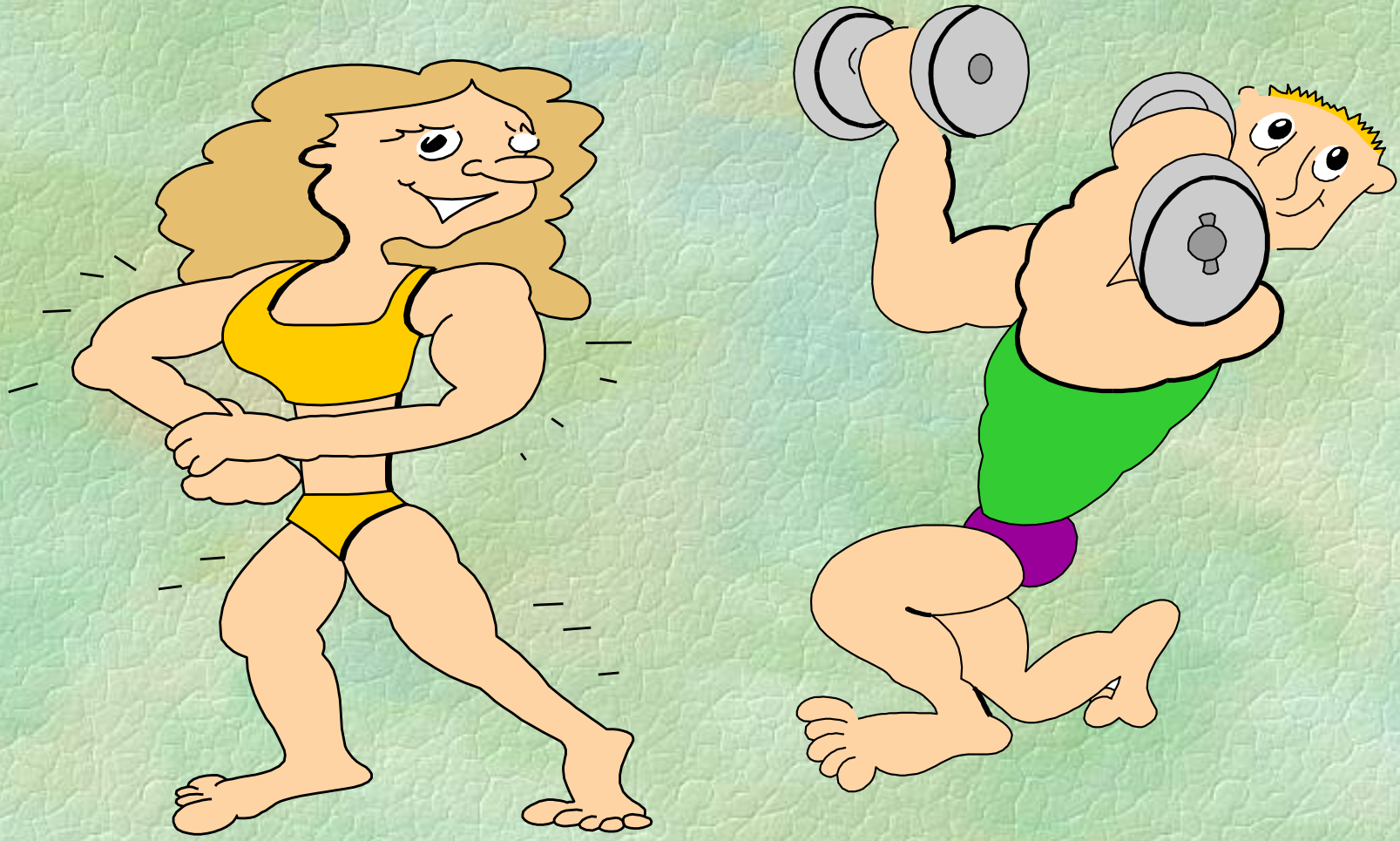
- Neuromuscular Overtraining - Protective Inhibition
- Metabolic Overtraining - Glycogen Depletion

Summary

- Specificity
- Overload
- Progression
- Periodization



Gender Differences



- Females Have ~2/3 Absolute Strength and Power of Men
  - Upper > Lower (Men Vs Women)
- Gap Narrows With Relativity
  - Per Csa- No Difference
- Hypertrophy About Same Relative to Starting
- Females Have ~1/10 Testosterone As Males

Ergogenic Aids/Nutritional Supplements

- Protein/Aa's: .8 G/Kg Rda, 1-2 G/Kg Athlete
- Creatine:
- Steroids: Anabolic/Androgenic
  - Androstendione (Derived From Pine Sap)
- Vanadium: Good If You're a Diabetic Rat
- Chromium: May Influence Body Composition

Weight Loss

Goals and methods for effective long term weight management.

Guidelines for Weight Loss:

by the American College of Sports Medicine

- Fasting & diet programs that severely restrict caloric intake can be dangerous.
- Weight loss resulting from an increase in energy expenditure is primarily in the form of fat weight.
- A nutritionally sound diet resulting in mild caloric restriction coupled with an endurance exercise program, along with behavioral modifications of existing eating habits, is recommended for weight reduction.

Rules of Weight Control

- Overweight does not always mean overfat.
- The “ideal” body fat % varies in each person.
- Intensity /duration of exercise influence the type & amount of fuel burned.
- Changes to body composition must be done gradually.
- Maintain adequate hydration.
- Carbohydrate is the most important energy source to enhance athletic performance.
- Maintain a well-balanced diet, reduce fat in diet.
- Recognize signs of eating disorders.